REMARKS/ARGUMENT

Claims 1-69 and 71-74 are pending.

Claims 60-67 are allowed.

Claims 1, 31 and 39 have been amended to overcome the objection set forth by Examiner. Accordingly, Claims 1-41 stand allowable.

Claims 45, 46, 50-52 and 72 would be allowable if rewritten in independent form including all limitations of the base claim and any intervening claims. By this amendment Claims 45, 50, 51 and 72 have been rewritten in independent form including all limitations of the base claim and any intervening claims. Accordingly, Claims 45, 46, 50-52 and 72 stand allowable.

Claims 42 and 68 have been amended to overcome Examiner's objections.

1) Claims 42-44, 47-49, 54-59 and 68-69 are rejected under 35 U.S.C. 103(a) as being unpatentable over Piret et al (US Patent No.: 6,560,291) in view of the admitted prior art (Fig. 2-3) and further in view of Dettman Introduction to Linear Algebra and Differential Equations. Applicants respectfully traverse this rejection, as set forth below.

Independent Claim 42 requires and positively recites, a plurality of transmit antennas for transmitting the signals, the signals comprising a plurality of independent streams of data symbols", "circuitry for selecting a linear basis transformation matrix **from one of at least two matrices in response to a communication received by the transmitter from the receiver via a feedback channel**" and "circuitry for multiplying the data symbols with the

linear basis transformation matrix, wherein the signals are responsive to the multiplication with the linear basis transformation matrix".

Independent Claim 68, as amended, requires and positively recites, a method of processing signals in a communication circuit, comprising the steps of: "receiving a plurality of signals", "modulating the plurality of signals", "**selecting a matrix from one of at least two matrices** in response to a signal from a remote transmitter", "multiplying the modulated signals by the matrix" and "transmitting the multiplied modulated signals from a plurality of transmit antennas".

In contrast, Piret discloses a transmitter and receiver wherein a sub-matrix is selected from a matrix (col. 4, lines 47-67). Indeed, the sub-matrix in Piret is selected such that it represents the transmitted data (as taught throughout the specification and claims, see also col. 17, lines 21-40 and claim 1, second paragraph). Nowhere does Piret teach or suggest more than one matrix AND that a matrix is selected from two or more matrices. Accordingly, Piret fails to teach or suggest, "circuitry for selecting **a linear basis transformation matrix from one of at least two matrices** . . .", as required by Claim 42 OR, "**selecting a matrix from one of at least two matrices** . . .", as required by Claim 68.

Similarly, neither the admitted prior art nor the Dettman reference teach or suggest the above high-lighted omission in the Piret reference. Accordingly, any combination of Piret, admitted prior art and Dettman fails to teach or suggest all of the limitations of Claims 42 and 68.

Further, there is no teaching in the Piret reference, or in the admitted prior art of Figs 1 or 2, or in the Dettman reference that teaches or suggests that the linear basis transformation matrix is selected in response to a communication received by the

transmitter from the receiver via a feedback channel. As such, any combination of Piret, the admitted prior art and Dettman fails to teach or suggest, "circuitry for selecting a linear basis transformation matrix ... **in response to a communication received by the transmitter from the receiver via a feedback channel**", as further required by Claim 42.

To establish a *prima facie* case of obviousness, three basic criteria must be met. First, there must be some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the reference or to combine reference teachings. Second, there must be a reasonable expectation of success. Finally, the prior art reference (or references when combined) must teach or suggest ALL the claim limitations. (MPEP § 2143). Applicants respectfully submit that the Examiner has failed to establish all three criteria. Thus, Claims 42 and 68 are patentable under 35 U.S.C. § 103(a) over any combination of Piret, the admitted prior art and Dettman.

Obviousness can only be established by combining or modifying the teachings of the prior art to produce the claimed invention where there is some teaching, suggestion, or motivation to do so found either explicitly or implicitly in the references themselves or in the knowledge generally available to one of ordinary skill in the art. "The test for an implicit showing is what the combined teachings, knowledge of one of ordinary skill in the art, and the nature of the problem to be solved as a whole would have suggested to those of ordinary skill in the art." *In re Kotzab*, 217 F.3d 1365, 1370, 55 USPQ2d 1313, 1317 (Fed. Cir. 2000). See also *In re Lee*, 277 F.3d 1338, 1342-44, 61 USPQ2d 1430, 1433-34 (Fed. Cir. 2002) (discussing the importance of relying on objective evidence and making specific factual findings with respect to the motivation to combine references); *In re Fine*, 837 F.2d 1071, 5 USPQ2d 1596 (Fed. Cir. 1988); *In re Jones*, 958 F.2d 347, 21 USPQ2d 1941 (Fed. Cir. 1992).

Examiner fails to offer any rationale for combining Piret with the admitted prior art and with Dettman. A statement that modifications of the prior art to meet the claimed invention would have been "well within the ordinary skill of the art at the time the claimed invention was made" because the references relied upon teach that all aspects of the claimed invention were individually known in the art is not sufficient to establish a *prima facie* case of obviousness without some objective reason to combine the teachings of the references. *Ex parte Levengood*, 28 USPQ2d 1300 (Bd. Pat. App. & Inter. 1993). See also *In re Kotzab*, 217 F.3d 1365, 1371, 55 USPQ2d 1313, 1318 (Fed. Cir. 2000) (Court reversed obviousness rejection involving technologically simple concept because there was no finding as to the principle or specific understanding within the knowledge of a skilled artisan that would have motivated the skilled artisan to make the claimed invention); *Al-Site Corp. v. VSI Int'l Inc.*, 174 F.3d 1308, 50 USPQ2d 1161 (Fed. Cir. 1999) (The level of skill in the art cannot be relied upon to provide the suggestion to combine references). Accordingly, for all the foregoing reasons, therefore, Claims 42 and 68 are patentable under 35 U.S.C. § 103(a) over any combination of Piret, the admitted prior art and Dettman.

Claims 43, 44, 47-49, and 54-59 stand allowable as depending directly, or indirectly, from respective allowable Claim 42. Claim 69 stands allowable as depending directly, or indirectly, from respective allowable Claim 68.

Claim 43 further defines the wireless transmitter of claim 42 wherein the receiver comprises, "circuitry for selecting the linear basis transformation matrix" and "circuitry for providing the communication to the transmitter via the feedback channel". Claim 43 depends from claim 42 and therefore stands allowable for the same reasons provided above in support of the allowance of claim 42. Moreover, Piret does not teach a receiver that selects the sub-matrix. The receiver simply attempts to detect which sub-matrix and the corresponding coefficients are selected and transmitted by the transmitter. This is evident from Fig. 4a and 4b (as well as the corresponding description) where the term "estimation"

is used and no sub-matrix "selection" is performed. And certainly there is no feedback to the transmitter. In Piret, Fig. 1 only describes the transmitter. The receiver is shown in Fig. 3 which is separate from the transmitter. The bus in Fig. 1 between input and output ports are simply the means to link the communication circuits with the memory (used to store the matrix and data) which is internal to the transmitter.

Claim 44 further defines the wireless transmitter of claim 43 wherein the circuitry for selecting the linear basis transformation matrix selects from a finite set of linear basis transformation matrices. Claim 44 depends from claim 43 and therefore stands allowable for the same reasons provided above in support of the allowance of claim 43.

Claim 47 further defines the wireless transmitter of claim 42 wherein the linear basis transformation matrix is operable for performing a rotation by the transmitter of the symbols. Claim 47 depends from claim 42 and therefore stands allowable for the same reasons provided above in support of the allowance of claim 42. Moreover, Piret discloses only one example of a linear transformation. Rotation is NOT inherent in Piret's linear transformation. For example, M=[1 2;1 3] will not accomplish any rotation.

Claim 48 further defines the wireless transmitter of claim 42 wherein the linear basis transformation matrix is operable for performing a rotation and phase change of the symbols. Claim 48 depends from claim 42 and therefore stands allowable for the same reasons provided above in support of the allowance of claim 42. Moreover, Piret discloses only one example of a linear transformation. Rotation is NOT inherent in Piret's linear transformation. For example, M=[1 2;1 3] will not accomplish any rotation. Similarly, a real-valued matrix will not change the phase of each component.

Claim 49 further defines the wireless transmitter of claim 42 wherein the linear basis transformation matrix comprises a form of $\mathbf{V}^{(n)} = \begin{bmatrix} \cos\theta_n & -\sin\theta_n \\ \sin\theta_n & \cos\theta_n \end{bmatrix}$. Claim 49 depends from claim 42 and therefore stands allowable for the same reasons provided above in support of the allowance of claim 42.

Claim 54 further defines the wireless transmitter of claim 42 wherein the signals comprise CDMA signals and further comprising circuitry for spreading the CDMA signals. Claim 54 depends from claim 42 and therefore stands allowable for the same reasons provided above in support of the allowance of claim 42.

Claim 55 further defines the wireless transmitter of claim 42 wherein the signals comprise TDMA signals. Claim 55 depends from claim 42 and therefore stands allowable for the same reasons provided above in support of the allowance of claim 42.

Claim 56 further defines the wireless transmitter of claim 42 wherein the symbols are selected from a group consisting of quadrature phase shift keying symbols, binary phase shift keying symbols, and quadrature amplitude modulation symbols. Claim 56 depends from claim 42 and therefore stands allowable for the same reasons provided above in support of the allowance of claim 423.

Claim 57 further defines the wireless transmitter of claim 42 wherein the receiver comprises a plurality of receive antennas. Claim 57 depends from claim 42 and therefore stands allowable for the same reasons provided above in support of the allowance of claim 42.

Claim 58 further defines the wireless transmitter of claim 57 wherein the plurality of transmit antennas and the plurality of receive antennas are a same number of antennas.

Claim 58 depends from claim 57 and therefore stands allowable for the same reasons provided above in support of the allowance of claim 57.

Claim 59 further defines the wireless transmitter of claim 57 wherein the plurality of transmit antennas are less in number than the plurality of receive antennas. Claim 59 depends from claim 57 and therefore stands allowable for the same reasons provided above in support of the allowance of claim 57.

2) Claims 71, 73 and 74 are rejected under 35 U.S.C. 103(a) as being unpatentable over Piret et al (US Patent No.: 6,560,291) in view of the admitted prior art (Fig. 2-3), further in view of Dettman (Introduction to Linear Algebra and Differential Equations), and further in view of Foschini et al (U.S. Patent No.: 7,050,510) Applicants respectfully traverse this rejection, as set forth below.

Claim 71 further defines the method as in claim 68, comprising the steps in any order of: "encoding the plurality of signals", "interleaving the plurality signals" and "converting the plurality of signals to serial signals". Even if, arguendo, Foschini discloses the teaching as suggested by the Examiner, Foschini fails to teach or suggest the previously described shortcomings of any combination of Piret, the admitted prior art and Dettman, as applied to Claim 68. Accordingly, any combination of Piret, the admitted prior art, Dettman and Foschini fails to teach or suggest all of the limitations of Claim 71.

Claim 73 further defines the method as in claim 68, wherein the matrix is a linear basis transformation matrix. Even if, arguendo, Foschini discloses the teaching as suggested by the Examiner, Foschini fails to teach or suggest the previously described shortcomings of any combination of Piret, the admitted prior art and Dettman, as applied to Claim 68.

Accordingly, any combination of Piret, the admitted prior art, Dettman and Foschini fails to teach or suggest all of the limitations of Claim 73.

Claim 74 further defines the method as in claim 68, comprising the step of encoding the plurality of signals, wherein the plurality of signals are encoded differently for each respective antenna of the plurality of transmit antennas. Even if, arguendo, Foschini discloses the teaching as suggested by the Examiner, Foschini fails to teach or suggest the previously described shortcomings of any combination of Piret, the admitted prior art and Dettman, as applied to Claim 68. Accordingly, any combination of Piret, the admitted prior art, Dettman and Foschini fails to teach or suggest all of the limitations of Claim 74.

3) Claim 53 stands rejected under 35 U.S.C. 103(a) as being unpatentable over Piret et al (US Patent No.: 6,560,291) in view of the admitted prior art (Fig. 2-3), further in view of Dettman (Introduction to Linear Algebra and Differential Equations), and further in view of Bevan et al (U.S. Patent No.: 6,897,897) Applicants respectfully traverse this rejection, as set forth below.

Claim 53 further defines the wireless transmitter of claim 42 and further comprising circuitry for space time block coded encoding the symbols. Even if, arguendo, Bevan discloses a space time coding multi-input multi-output system using space time decoders, as suggest by the Examiner, Bevan fails to teach or suggest the previously described shortcomings of any combination of Piret, the admitted prior art and Dettman, as applied to Claim 42. Accordingly, any combination of Piret, the admitted prior art, Dettman and Bevan fails to teach or suggest all of the limitations of Claim 53.

Claims 60-67 are allowed. Claims 1, 31 and 39 have been amended to overcome the objection set forth by Examiner. Accordingly, Claims 1-41 stand allowable. Examiner identified Claims 45, 46, 50-52 and 72 as being allowable if rewritten in independent form including all limitations of the base claim and any intervening claims. By this amendment Claims 45, 50, 51 and 72 have been rewritten in independent form including all limitations of the base claim and any intervening claims. Accordingly, Claims 45, 46, 50-52 and 72 stand allowable.

Claims 42 and 68 have been amended to overcome Examiner's objections and to overcome the art rejection cited by Examiner. Claims 43, 44, 47-49, 53-59, 68, 69, 71, 73 and 74 depend therefrom and are similarly allowable. Applicants respectfully request reconsideration and allowance of the application at the earliest possible date.

Respectfully submitted,

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